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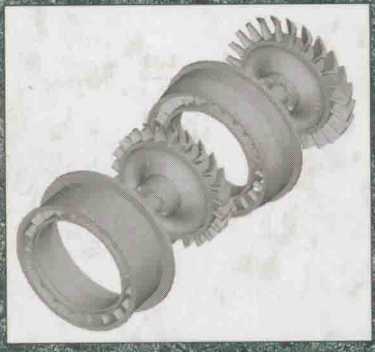
THIRD EUROPEAN CONFERENCE ON

TURBOMACHINERY: FLUID DYNAMICS AND THERMODYNAMICS

VOLUME B



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Conference Transactions

Third European Conference on

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Fluid Dynamics and Thermodynamics

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Compressors

C557/106/99

Concerted experimental and numerical studies on axial flow fan rotor aerodynamics

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Dipartimento di Meccanica e Aeronautica, University of Rome, Italy
F BENCZE and **J VAD**
Department of Fluid Mechanics, Technical University of Budapest, Hungary

SYNOPSIS

The paper reports a concerted application of experimental (Laser Doppler Anemometry, LDA) and Computational Fluid Dynamics (CFD) techniques for an investigation of the high average total head rise axial flow fan rotor of non-free vortex design. The LDA data have been used as inlet boundary conditions for CFD calculations as well as a basis for verification of computational results. From a comparison of outlet LDA and CFD data, possible improvements in the computational technique have been pointed out. The interblade CFD results supplied guidelines for improvement in the rotor cascade design method.

NOTATIONS

Latin letters

c	absolute velocity
$c_{\varepsilon 1}, c_{\varepsilon 2}$	turbulent dissipation rate production constants
d	prescribed Dirichelet boundary conditions
f	residual forces vector
k	turbulent kinetic energy
ℓ	blade chord
n_j	normal vector Cartesian components
p	pressure
r	radius
$R = r/r_c$	dimensionless radius
t	blade pitch
u_c	reference velocity ($r_c \cdot \omega$)
u_i	relative velocity Cartesian components
$\overline{u_i' u_j'}$	Reynolds stress tensor
v	prescribed Neumann boundary conditions

Greek letters

γ	blade stagger angle